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Original Article

Legal Highs on the Internet

JENNIFER HILLEBRAND, DEBORAH OLSZEWSKI, AND ROUMEN SEDEFOV

European Monitoring Centre for Drugs and Drug Addiction (EMCDDA), Lisbon, Portugal

This article describes the findings of a descriptive analysis of 27 online drug retailers selling legal alternatives to illegal drugs, commonly referred to as "herbal highs" and "legal highs" in 2008. The study attempted to quantify the online availability of drug retailers, to describe common products and characteristics in EU-based retail sales. The findings highlight the concern about the lack of objective information about products offered, including potential risks to health. Systems should be developed to assess the contents of products and the accuracy of information provided on the Internet, alongside continued monitoring of this market for "legal high" substances.

Keywords legal highs; herbal highs; Internet; online drug retailer; online shop

Introduction

Over the past 10 years, the Internet has increasingly become a central feature in the way we communicate and access information. Forty percent of families in the European Union (EU) have at least one means of Internet access at home (Eurostat, 2007). It was estimated that 55.7% of the EU population use the Internet, which represent an increase of 189% since 2000 (Internet World Stats, 2007). In a survey among 15–24-year-old population in the EU, it was shown that the Internet was the most popular source of information about illicit drugs and their use. Sixty-one percent of respondents said that they would turn to the Internet to find out more about illicit drugs and drug use in general. The other major sources of illicit drugs and their percentages are as follows: friend (35%), doctor, nurse, or other health professionals (34%), parents/relatives (27%), and drugs counsellor/center (25%) (European Commission, 2008).

The Internet constitutes a significant source of information about almost everything, including legal and illegal drugs and emerging drug trends. Psychoactive substances are

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Address correspondence to Deborah Olszewski, European Monitoring Centre for Drugs and Drug Addiction (EMCDDA), Cais do Sodre, 1249-289 Lisbon, Portugal; E-mail: Deborah.Olszweski@emcdda.europa.eu.

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being sold on the Internet, and a wide variety of information on these drugs is being provided. As a result, the Internet poses challenges to parents, health and drug prevention professionals, as well as international drug control, particularly when new drugs are being sold on a remote, buy-from-anywhere basis.

In order to follow the trends on what type of drugs are being sold, and/or what type of drug-related information is being provided on the Internet, systematic observation is necessary. Methods for the monitoring of this source are being developed along with the monitoring of more traditional drug indicators.

Nevertheless, to date there have been only few published investigations on drugs on the Internet. Schifano and Deluca (2005) presented the first European overview on the availability of online information on psychoactive compounds. The authors analyzed 1,633 unique Web sites related to the information on the consumption, manufacture, and sale of psychoactive substances. Studies focusing on particular drugs on the Internet have been conducted by Deluca and Schifano (2007), who systematically analyzed information available online on ecstasy (MDMA). Salvia divinorum and how it is represented on the Internet as a new drug was investigated by Siemann, Specka, Schifano, Deluca, and Scherbaum (2006). The emergence of Internet repositories of drug-related information, such as The Lycaeum (http://www.lycaeum.org/) and Erowid (www.erowid.org), prompted a qualitative review of information provided by Montagne (2008).

As far as online sales of drugs are concerned, the unabated increase of illicit sale of pharmaceuticals containing controlled narcotic drugs and psychotropic substances via the Internet has raised international concern (International Narcotics Control Board: INCB, 2007). Recently, several investigations looking at sites selling controlled substances on the Internet without a valid prescription have been carried out (Forman, Marlowe, and McLellan, 2006; Schepis, Marlowe, and Forman, 2008). Specific investigations on retailers selling legal drugs or alternatives to illegal drugs are still lacking despite the fact that in recent years there has been a boom in, for example, the number of online shops selling psychoactive "alternatives" of controlled drugs such as LSD, ecstasy, cannabis, and opiates. These psychoactive substances are generally referred to as "legal highs" or "herbal highs."

One reason for the overall scarcity of studies of drug-related Web sites may be the nature of the Internet sources, which present challenges in the field of research to develop standardized and comparable methods for evaluating such sites. These include a dearth of standard directions for monitoring and assessing the quality and validity of online information. However, more systematic analyses are important in order to pinpoint risk and potential negative influences that drug-related sites may have on consumers, in particular young people. Boyer, Lapen, Macalino, and Hibberd (2007) have shown how innovative drug-using adolescents circulate Internet drug information and experiences to their peers. However, there are considerable doubts about the accuracy of drug information. For example, in a review of selected representative Web sites on psychedelic drugs, Montagne (2008) had concluded that sites vary considerably in terms of the quality and objectivity of information.

In 2005, the European Monitoring Centre for Drugs and Drug Addiction (EMCDDA) initiated its European Perspectives on Drugs (E-POD) project, which provides practical experience for the development of a European system to detect, track, and understand the emerging trends. Within the framework of E-POD, the EMCDDA conducted in early 2008 an investigation on EU-based online drug retailers selling legal alternatives to illicit drugs. The aims of the investigation were as follows: (i) To quantify the online availability of these drug retailers. (ii) To identify and describe common products, characteristics, and developments in EU-based retail sales of herbal highs and legal highs. (iii) To assess the information provided by online retailers according to selected categories.

Methods

For the investigation, the authors chose the search engine Google (http://www.google.com) to (i) identify the number of Web sites selling herbal high and legal high products; and (ii) assess the contents of a selected number of identified legal/herbal high shops. Internet searches were conducted in January 2008. Content analyses of selected samples of identified sites were conducted between February 2008 and June 2008. A number of search terms were submitted in Dutch, English, French, German, Portuguese, and Spanish. In English, these terms were "sale legal highs," "legal high shop," "smart shops," "herbal high shop," and "party pill shop," with their equivalent translations in other languages.

Web Sites Selling Herbal and Legal Highs

In order to identify Web sites selling herbal and legal highs, the first 100 links identified by searches were noted, and the related Internet addresses (URLs) and broad characteristics of the retail sites were described. The sites were categorized according to their country of origin. Web sites registered with EU Member State country code domains (e.g., fr, de, es) or other indications of being EU-based (e.g., contact address) were used for identifying the country of origin of the site. A random selection was then undertaken, with samples for each country of origin being proportional to that of the total sample of online retailers. This provided a broad sample across different country domains in order to enable comparison and draw conclusions. Some excluding factors were taken into account: Retailers that exclusively provided products on wholesale basis were excluded, as well as those that only sold hallucinogenic mushrooms, drug paraphernalia, and cannabis seeds.

Information Assessment of Selected Number of Online Legal High Shops

To assess the information provided by retailers, a set of seven categories were chosen. The main guiding principle in selecting these categories was the information that could be considered important to avoid potential health risks from the products (e.g., overdosing, misconceptions about the effects, etc.). These categories were: (i) provision of information on ingredients of products; (ii) provision of information on dosages for products; (iii) information on potential negative side effects of products, or indication of whether any negative side effects exist; (iv) warnings about interactions with other psychoactive substances, about dangers when the product is used under certain physical and/or mental conditions, and/or when driving; (v) references and/or links to further information sources (e.g., Erowid); (vi) feedback mechanisms provided via online submission forms and/or online customer reviews/ratings of products (e.g., the possibility for the Internet user to send or post a message directly on the site); and (vii) provision of other means for exchange of information among users via forums or blogs.

Results

Online Availability of Drug Retailers of Legal High Products

A total of 69 EU-based online retailers were identified selling various types of herbal/legal highs. Within the EU, the vast majority of online retailers selling legal alternatives to illegal drugs appear to be based only in few countries. More than half of the retailers (52%) were located in the United Kingdom and 37% in the Netherlands (Table 1). The different types

Table 1
Number of the total identified online shops by country selling legal alternatives to illegal drugs

Country	Total number of sites identified (%)	Number of sites selected for further analysis
Austria	3 (4.4)	1
Ireland	1 (1.5)	0
Germany	4 (5.8)	2
Netherlands	25 (36.2)	10
UK	36 (52.2)	14
Total	69 (100)	27

of online shops selling herbal and legal highs were mainly described as smart shops or legal high shops. They offered a wide range of herbal, semisynthetic, and synthetic substances. Some were "head shops," i.e., shops that predominately sell drug paraphernalia, such as hash pipes and bongs. Overall, retailers often categorize these drugs into herbal highs and party pills or herbal psychedelic and herbal stimulants.

Although these products are generally promoted as being "legal," those advertised as being herbal highs or legal highs on a site based in one country may well be already under control in another. In addition, a package that is sent as legal trade in one country may come under the jurisdiction of illegal trafficking laws by the time it reaches its destination.

Out of the 69 identified shops, a total of 27 were selected for further analysis. While the majority of online retailers were based in the United Kingdom and the Netherlands, seven out of 27 selected for further analysis had more than one language version, and three provided links to free online translation tools (e.g., Babelfish; http://babelfish.yahoo.com/). A total of eight different European languages (Dutch, English, French, German, Greek, Italian, Portuguese, and Spanish) were covered.

Products Sold and Offered for Sale

Over 500 different products were being advertised at the selected shops. These products ostensibly produced a wide spectrum of psychoactive effects, such as euphoria, stimulation, alterations of consciousness, relaxation, and alleviation of after-party symptoms (muscle cramps, fatigue). However, the contents of many sold drugs were not confirmed by independent laboratory analyses; therefore, the real contents of the products could not be established. The most commonly sold legal highs are salvia divinorum, kratom, Hawaiian baby woodrose, and magic mushrooms (EMCDDA, 2006), and a variety of party pills such as happy caps, NXT phase, and London Underground products.

The herbal high salvia divinorum was sold by 20 of the 27 (74%) selected shops. Salvia divinorum has been described as producing hallucinogenic effects similar to those of LSD. It is a psychoactive herb that has a long tradition of being used in religious contexts by Mexican Indians. Salvia divinorum owes its psychoactive properties to salvinorin-A, its main active principle. Inhalation of the vaporized active principle has been found to be active in doses as low as 200 μg (Siebert, 1994), in the same range as LSD. The retailers have developed methods to produce extractions of salvia divinorum in order to enhance its psychoactive effects.

In the course of the study, it was observed that increasingly higher strength of salvia divinorum extracts were sold. While in February 2008 none of the shops had sold salvia divinorum, 60 times more concentrated than plain leaf extract was sold by five online retailers in April 2008.

Other herbal highs with hallucinogenic properties being sold included seeds of Hawaiian baby woodrose (*Argyreia nervosa*) (13 out of 27 shops, 48%) and, to a lesser extent, morning glory (*Ipomoea violacea*) (8 out of 27 shops). Both types of seeds contain d-lysergic acid amide (LSA), which is chemically close to LSD but much less potent.

Psilocybin- and psilocin-containing fungi (e.g., *Psilocybe cubensis*), a previously popular hallucinogenic herbal high has disappeared from the market following changes in drug control legislation in the United Kingdom in 2005 and ban in the Netherlands in 2008. Only five out of 10 Dutch Web sites that were selected for further analysis sold these products. Instead, an emerging interest in selling alternative, legal types of hallucinogenic mushrooms, such as *Amanita muscaria* (Fly agaric) (EMCDDA, 2006), was observed.

Kratom (*Mitragyna speciosa*) was being sold by nearly half of all investigated legal high shops (12 out of 27 shops, 44%). Kratom is often marketed as an opium substitute (tree) from southeast Asia. It is also supposed to produce euphoric effects of both stimulation and sedation (Erowid). Its active ingredients are the alkaloids mitragynine and 7-hydroxymitragynine.

Online retailers also frequently sold a variety of "smoking blends." These are mainly advertised as alternatives to cannabis, and contain a mix of herbs and herbal extracts. A frequently encountered smoking blend is Spice or Spice Gold (e.g., 10 out of 27 shops, 37%). Common ingredients of Spice Gold are reported to include a range of herbs such as baybean (*Canavalia rosea*), blue lotus (*Nymphaea caerulea*), Scullcap (*Scuttelaria nana*), or Maconha brava (*Zornia latifolia*), all of which are supposed to have relaxing and hallucinogenic effects.

While in February 2008, Spice Gold was marketed as the strongest smoking blend across online shops, a new and supposedly stronger product, Spice Diamond, appeared in the market by June 2008. However, based on the Internet information on ingredients, the differences between these two products remained unclear.

"Party pills" belong to another commonly found category of legal highs. They are generally sold as alternatives to ecstasy and are described to cause stimulant, euphoric, and entactogenic effects. They are sold as purely herbal, semisynthetic, or synthetic pills. Herbal pills contain herbs (e.g., *Sida cordifolia*, which is included in *Happy Caps*, *Groove-E*), or plants (e.g., *Griffonia simplicifolia*, a natural source of the amino acid 5-Hydroxytryptophan and included in "Blow up caps"). The main ingredients of synthetic party pills are often claimed to be benzylpiperazine (BZP) and a combination of other additives, such as amino acids (contained in E = XTC and NXT phase products). Piperazine derivatives, which appeared in Europe between 2004 and 2006 (EMCDDA, 2007), are a group of synthetic substances derived from the parent compound piperazine including BZP, mCPP (1-(3-chlorophenyl) piperazine), TFMPP (triflouromethylphenylpiperazine), and pFPP (parafluorophenylpiperazine). These substances exhibit stimulant or ecstasy-like effects (EMCDDA, 2007). pFPP emerged as an ingredient on retail sites of the included online retailers in April 2008. Retailers have reported that pFPP has mild hallucinogenic and strong euphoric effects. "BZP-free" party pills are now marketed (e.g., London Underground Neuro Blast 3.1 pills) as the next-generation legal party pills. Sixteen out of 27 shops (59%) sold these in June 2008. These pills could fill the vacuum caused by BZP, which has come under drug control measures in EU Member States (European Council, 2008; Council Decision 2008/206/JHA).

Table 2
Proportion and number of online retailers of herbal and legal highs ($N = 27$) for various categories

Categories	*N* (%)	Yes (for all products)	Partly*
Provision of information on ingredients	0 (0)	17 (63)	10 (37)
Provision of information on dosage	4 (15)	10 (37)	13 (48)
Provision of information on potential negative side effects or indication of whether known negative side effects exist	11 (41)	4 (15)	12 (44)
Warnings about interactions with alcohol and/or medications as well as dangers when used under certain physical and/or mental conditions and or driving.	9 (33)	14 (52)	4 (15)
References and or links to further information sources (e.g. Erowid)	14 (52)	13 (48)	N.A
Feedback mechanisms provided via online feedback forms and/or online reviews/ratings of products	6 (22)	21 (78)	N.A
Other means for exchange of information among users provided (e.g. forums or blogs).	20 (74)	7 (26)	N.A

*Information was available for some of the products.

Marketing

While the majority of the legal highs are sold legally in many European countries, retailers are careful not to encourage any illegal activity or direct promotion of products as drugs (e.g., bottles of volatile substances on the basis of organic solvents are called "room odourisers"). Many products are marketed as "herbal" or "natural drugs," implying no health risks. Legal products sold by online shops frequently elude the effects of the sold product (e.g., Feel the Rush, Feel the Love, Head Rush, and Neuro Trance). Some explicitly express its role as a substitute or alternative to illegal drugs (E = XCT, Legal E). Others provide an indirect link to illegal drugs through their market name. For example, the product Purple Ohms has the same name as an LSD blotter in the 1960s. The name of legal high Strawberry Fields, a benzylpiperazine and piperazine blend, was borrowed from the LSD blotter and links to the famous Beatles song (widely reported to have been influenced by John Lennon's LSD experiences).

Assessment of Information Provided by Retailers

The content analysis of online retail sites for these substances showed that the extent of information varies among different sites. Table 2 provides an overview of the type of information provided by online retailers based on the above-mentioned seven categories.

As regards the information on the products, it has been found that about 40% of retailers do not provide information about potential negative effects, or whether such effects are known to have occurred. Many of these legal highs may have side effects when taken in

high doses. About half of retailers (52%) provide warnings about the concurrent use of alcohol and/or medication, as well as potential dangers of their use when suffering from certain physical/mental conditions, and/or when driving, and/or operating machinery.

The majority of retailers (63%) provide information on the ingredients of their products. However, information about main active ingredients and/or their quantities was lacking. As far as the information on dosage is concerned, most retailers provide this, although about half (48%) do so for some of their products. However, it was observed that such information was lacking particularly for new products. About half of the retailers (48%) referred to other information sources about their products. Frequently, the drug repository Erowid was mentioned, followed by links to other information sites, articles, or books. Feedback on products is encouraged on more than two-thirds of the sites (78%). However, forums integrated into the online retail site were less frequent (26%).

Prices

Typical retail unit prices of legal highs vary from less than EUR 1 to EUR 38. The most expensive products found in the market were Spice Diamond at EUR 8–10 for 1 g and Salvia Divinorum Extract 60x (60 times more concentrated than the plain leaf) at EUR 18–38 per g.

Although comparisons of prices of illegal drugs in the EU are difficult to make, it appears that, overall, legal alternatives to illegal drugs appear cheaper, with the exception of new products. For example, in 2005, the range of typical retail price in the EU for

Table 3
Range of retail prices in € and typical prices (mode) of selected legal high products between February and June 2008

Product	Range of retail price in €, Feb-Jun 2008	Typical retail price in € (mode)	*N**
Legal highs			
Salvia divinorum extract 10 × (1 gram)	17.8–38	25	19
Salvia divinorum extract 60 ×	32–63	37.9	5
Kratom extract ×15 (1 gram)	2.1–10.3	6.5	10
Hawaiian Baby Woodrose seeds (5 seeds)	3–4.5	4	13
Morning Glory (1 gram)	0.3–1	0.5	7
Spice Gold (1 gram)	5.3–10.3	6.6	10
Spice Diamond (1 gram)	8–10	10	8
E = XTC (1 capsule)	2–5.6	5.6	6
NXT Phase Blue (1 capsule)	1.4–12.5	1.3	10
London Underground products (1 capsule)	8–9	8	10
Happy Caps Groove E (1 capsule)	1.8–2.1	2	7
Psilocybe Cubensis Mexican (30 gram)	6–11	9	3

*Number of total sites listing prices.

one tablet of ecstasy was EUR 3–15, which is more expensive than the proclaimed legal alternative E = XTC (EMCDDA, 2007). Table 3 provides an overview on the range of retail prices and typical retail prices (mode) for commonly sold legal highs.

Conclusion

The current investigation showed that there are numerous online shops based in the EU selling a wide range of legal highs as alternatives to illegal drugs. These appear to be located in a few Member States of the EU, mainly in the Netherlands and the United Kingdom, although many online shops target customers from other countries by providing different language versions of their Web sites.

A number of observations could be made on some of the characteristics of this online drug market as well as on potential health risks.

The "balloon effect" claims that the suppression of a product, for example, through drug legislation, drives the drug business to other geographical locations or products (Bagley, 1988). Online retailers attempt to react to new legislation by changing the supply of one product to a legal alternative, and possibly in some cases to alternatives that are more toxic. The promotion of Amanita muscaria mushrooms (*Fly Agaric*) and BZP-free pills illustrate this phenomenon.

Legal highs appear to be highly affordable, except for newly marketed products. Generally, products are marketed as "natural" or "herbal," which is used by retailers to be synonymous with "harmless." There is also a tendency toward stronger, more effective drugs that mimic the effects of illegal drugs. These products may carry health risks due to poor understanding of their pharmacology and toxicology, kratom being a good example (Boyer, Babu, Adkins, McCurdy, and Halpern, 2008). In addition, these products fall outside pharmaceutical licensing regulations and regulatory control, and consequently their quality is not subject to scrutiny.

Considerable variation was noted regarding the amount of information provided by online retailers about the mode of use and health risks of the products they were selling. There was almost no information on the active ingredients of many products, a lack of information on dosages and potential negative side effects, and many sites offered no means to provide customer feedback.

Based on these observations, we have concluded that the development of the online drug market for herbal and legal highs should be closely followed, and issues about the risks of taking these drugs need to be raised. Young people in particular rely on the Internet for gaining such information, and the ubiquity of the Internet means that there are few barriers on accessing such online shops. Young people, and especially novice drug users, may also be most receptive to new ideas presented on the Internet (Brewer, 2003). Systems should be developed to assess the information provided by retailers, and to ensure the accuracy and objectivity necessary for Internet users. Retailers themselves should also bear some responsibility and should provide information on effects and dosages.

More information about emerging psychoactive drugs is also needed in order to familiarize these to clinical toxicologists, poison control specialists, as well as professionals working in the field of drug prevention and harm reduction. Finally, more data on prevalence and consequences of use are needed to explore trends as well as to assess the potential risks for those who may be using these drugs.

This investigation has several limitations. First, only one search engine (Google) was used to identify online retailers of legal highs. Search engine statistics show that Google

is the most widely used engine[1] when measured against search hours and the number of searches. However, use of other search engines, e.g., Yahoo (www.yahoo.com) may have contributed to a larger pool of identified EU-based online retailers of these substances. Second, the current searches only used a limited number of key words in a limited number of languages, thus we cannot make any conclusions about the overall presence of retailers in the EU. Third, although the selected criteria for the assessment of online retail sites looked at the extent to which additional information about the products is provided, no conclusions were made about the validity of the information itself.

For future research directions, we suggest to continue monitoring the legal high market, ideally using more than one search engine and a wider range of European languages. In addition, there is a need to conduct regular toxicological analyses of products sold in order to establish the ingredients and identify any related health risks.

Declaration of interest: The authors report no conflict of interest. The authors alone are responsible for the content and writing of this paper.

RÉSUMÉ

Legal highs` sur l'Internet

Cet article décrit les résultats d'une analyse descriptive, menée en 2008, de 27 boutiques de drogues en ligne proposant des alternatives légales aux drogues illégales, généralement dénommées ˆherbal highs´ et ˆlegal highs˜. L'étude a essayé de mesurer la disponibilité en ligne des boutiques de drogues, de décrire les produits et les caractéristiques communes de ce type de ventes au détail basées dans l'UE. Les résultats attirent l'attention sur le manque d'informations objectives sur les produits offerts, et sur les risques potentiels pour la santé. Des systèmes devraient être développés pour examiner le contenu des produits et l'exactitude de l'information diffusée sur l'Internet, simultanément à la surveillance continue de ce marché des substances " legal highs´.

RESUMEN

Legal highs˜ en Internet

Este artículo describe los resultados de un análisis descriptivo en 2008 de 27 minoristas de droga en línea que venden alternativas legales a las drogas ilegales, conocidas comúnmente como ˆherbal highsý ˆlegal highs˜. El estudio intentó cuantificar la disponibilidad en línea de los minoristas de droga, para describir productos comunes y características de las ventas al por menor basadas en la UE. Los resultados destacan la preocupación por la falta de información objetiva de los productos ofrecidos, incluyendo potenciales riesgos para la salud. Los sistemas se deben desarrollar para determinar el contenido de productos y la exactitud de la información proporcionada en Internet, junto a la supervisión continua de este mercado para las sustancias ˆlegal highs˜.

[1]http://www.submitawebsite.com/blog/search-engine-stats.html, http://www.1cog.com/search-engine-statistics.html.

THE AUTHORS

Jennifer Hillebrand, M.A., M.Sc., works as a scientific analyst in the interventions, law and policies unit at the European Monitoring Centre for Drugs and Drug Addiction (EMCDDA). She received M.A. in Psychology from the Johannes Gutenberg-University, Mainz, Germany and a Master's in Clinical and Public Aspects of Addiction from Kings College, London, UK. Her special interests are qualitative methods and emerging drug trends as well as best practices in drug demand reduction.

Deborah A. Olszewski, M.Sc., is a senior scientific analyst in the Department of Epidemiology at the European Monitoring Centre for Drugs and Drug Addiction (EMCDDA) in Lisbon, Portugal. Her main areas of responsibility are in prevalence and patterns of drug use in general and school populations in the EU and in developing methods for detecting, tracking, and understanding emerging drug trends. She is a trained medical sociologist and has previous work experience in the UK health service and academic research in both the United Kingdom and Italy, specializing in information for patients and social research in the fields of health and drug problems.

Roumen Sedefov, MD, is the Head of Sector Action on dew drugs at the European Monitoring Centre for Drugs and Drug Addiction (EMCDDA), where he is responsible for the implementation of the EU early-warning system on new psychoactive substances. His interest is mainly in the field of risk assessment of new drugs and the use of forensic analysis and toxicology data to bridge the knowledge gap between the findings of quantitative indicators and qualitative (including Internet) studies and the substances used in reality.

Glossary

Internet: The Internet is a global system of interconnected computer networks that interchange data by packet switching using the standardized Internet Protocol Suite (TCP/IP). It is a "network of networks" that consists of millions of private and public,

academic, business, and government networks of local to global scope that are linked by copper wires, fiber-optic cables, wireless connections, and other technologies.

Legal/herbal highs: Psychoactive "alternatives" to controlled drugs such as LSD, ecstasy, cannabis, and opiates. These psychoactive substances are generally referred to as "legal highs" or "herbal highs." They are herbal, semisynthetic or synthetic drugs.

Mode: The value that has the largest number of observations.

Online drug retailers: They buy legal psychoactive substances from manufacturers or importers, either directly or through a wholesaler, and then sell smaller quantities to the end-user via the Internet.

Online shop: An online shop, e-shop, e-store, Internet shop, Web shop, Web Store, online store, or virtual store evokes the physical analogy of buying products from a retailer or in a shopping mall.

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